Space Weather Forecast

Issued on Friday, 12 May 2023 at 14:41 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate geomagnetic storm conditions expected on 12 and 13 May, with a chance of G3/Strong storms due to the CME (coronal mass ejection) arrival. S1/Minor Solar Radiation Storm easing. R1/R2 Minor/Moderate radio blackouts expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the last 24 hours, with a short duration flare originating from a region located in the southwest quadrant. This region has since shown signs of decay. It was quickly followed by a CME (Coronal Mass Ejection) which has been analysed as not Earth-directed. However confidence is low, due to limited satellite imagery at that time. There are currently nine sunspot regions on the visible disc. Two previously active regions in the northwest quadrant, appear to have stabilised. The remaining five of nine numbered regions all appear to be stable or benign. Aside from the CME mentioned, no further Earth-directed CMEs have been identified on available imagery.

Solar Wind / Geomagnetic Activity: The solar wind parameters are indicative of a CME (Coronal Mass Ejection) arrival. The solar wind suddenly increased by 100km/s at 12/0547UTC to reach 550-580km/s. It is now slowly declining, currently around 520km/s, however the total magnetic field strength behaved in a similar way, increasing suddenly around the same time. The north-south component was weak but became enhanced and started to behave erratically. It was however predominantly positive, resulting in a rather muted response from the geomagnetic activity which remained Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: Solar radiation remained below the S1 Minor Solar Radiation Strong threshold over the past 24 hours.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is currently close to background levels but is expected to become increasingly Moderate over the next four days. The risk is not negligible initially but is expected to gradually transfer east and come from other regions, which are growing in size and complexity.

Solar Wind / Geomagnetic Activity: A full halo CME (Coronal Mass Ejection) which left the Sun late on 09 May has arrived at Earth early this morning (12 May). The associated magnetic field is currently unfavourable to the development of any significant geomagnetic activity but its effects are expected to increase through the day and into 13 May, with a risk of G1 or G2 (Minor or Moderate) storms and even a chance of G3 (Strong) storm intervals. The effects of the CME are expected to subside at the end of day 2 (13 May), the 14 and 15 May remaining largely Quiet with odd Unsettled period.

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Energetic Particles / Solar Radiation: Although solar radiation levels are expected to remain at background levels throughout this period, the risk of reaching the S1 level is considered possible (low probability) today and tomorrow (12 and 13 May), should there be any significant flare originating from one of the westernmost sunspot regions.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	90	80	20	10
Strong	G3	No	50	30	5	1
Severe	G4	No	15	10	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	30	40	50	60
Very Active	R3 to R5 X	No	5	10	15	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	40	30	20	10
Very Active	≥ S3 *	No	5	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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